

**STATE OF LOUISIANA
SOUTHEASTERN LOUISIANA UNIVERSITY
HAMMOND, LOUISIANA
A Member of the University of Louisiana System**

**INVITATION TO BID
TO
FURNISH AND DELIVER
205 KW GENERATOR W/600 AMP ATS, REMOTE ANNUNCIATOR, ETC.
FOR THE
SOUTHEASTERN LOUISIANA UNIVERSITY
PHYSICAL PLANT DEPARTMENT**

ISSUING AGENCY: Southeastern Louisiana University
Purchasing Department
SLU 10800
Hammond, LA 70402

DIRECTOR OF PURCHASING: Ed Gautier

PROCUREMENT SPECIALIST 2: Theresa Zeigler
Telephone: (985) 549-5412

ENGINEER: Chris Asprion <Chris.Asprion@selu.edu>
Telephone: (985) 549-3333

RELEASE DATE: May 13, 2010

DEADLINE FOR SUBSTITUTES: May 20, 2010 (See Page 1 of Specifications 1.0.2)

ITB RETURN DATE: June 3, 2010

ITB RETURN TIME: 2:00 p.m., Central Time

BID OPENING LOCATION: Southeastern Louisiana University
Purchasing Department
Property Control & Supply Building
2400 North Oak Street
Hammond, Louisiana

NOTE: THIS SOLICITATION IS A **SEALED BID** AND MUST BE RETURNED BY MAIL OR DELIVERED IN PERSON. BID RESPONSE FORMS CANNOT BE FAXED AND ANY FAX RESPONSES SHALL BE REJECTED.

This ITB is available in electronic form at <http://wwwprd.doa.louisiana.gov/osp/lapac/pubmain.asp> It is available in PDF format or in printed form by submitting a written request to the Procurement Specialist listed above. It is the Bidder's responsibility to check the Office of State Purchasing LaPAC website frequently for any possible addenda that may be issued. Southeastern is not responsible for a bidder's failure to download any addenda documents required to complete an Invitation to Bid.

STATE OF LOUISIANA
SOUTHEASTERN LOUISIANA UNIVERSITY
HAMMOND, LOUISIANA

The Southeastern Louisiana University (SLU) Purchasing Department will receive sealed bids until 2:00 P.M. on the bid opening date specified in the solicitation document. No bid responses will be considered by the SLU Purchasing Department after 2:00 P.M. Beginning at that time, bids shall be publicly opened and read aloud to those present in the SLU Purchasing Department.

<p>Mail address: Southeastern LA University Purchasing Department SLU 10800 Hammond, LA 70402</p>	<p>Delivery: Southeastern LA University Purchasing Department Property Control & Supply Bldg 2400 North Oak St Hammond, LA 70402</p>
--	--

Bids submitted are subject to LA R.S. 39:1551-1736; Purchasing Rules and Regulations; Executive Orders; General Conditions; any Special Conditions; and Specifications listed in the solicitation document.

The purpose of this solicitation is to set forth the requirements and specifications of Southeastern Louisiana University. The contents of this solicitation and the Bidder/ Vendor/ Contractor's bid response shall become contractual obligations if a contract (purchase order) ensues.

INSTRUCTIONS TO BIDDERS

- 1) Bid Forms: All written bids, unless otherwise provided for, must be submitted on, and in accordance with, forms provided, properly signed in ink by an authorized representative of the bidding entity. Bid prices shall be typewritten or in ink. Bids submitted in the following manner will not be accepted: (1) bid contains no signature indicating intent to be bound; (2) bid filled out in pencil; (3) photocopy of bidder's signature; and (4) bid sent by facsimile equipment. Price alterations to bid responses received before bid opening time will be considered provided the written price alteration has been received and time-stamped before bid opening time. Any other alterations of the bid response form or foreign conditions attached thereto may cause rejection of the bid response without further consideration.
- 2) Standard of Quality: Any product or service bid shall conform to all applicable Federal and State laws and regulations and specifications contained in the solicitation document. Unless otherwise specified in the solicitation document, any manufacturer's name, trade name, brand name, or catalog number used in the specifications is for the purpose of describing the quality level and characteristic required. Bidder should specify the brand and model number of the product offered in his bid. Bids not specifying brand and model number shall be considered as offering the exact products specified in the solicitation document.
- 3) Descriptive Information: Bidders proposing an equivalent brand or model should submit with the bid response information (such as illustrations, descriptive literature, technical data) sufficient for the University to evaluate quality, suitability, and compliance with the specifications of the solicitation document. Failure to submit descriptive information may cause bid to be rejected. Any change made to a manufacturer's published specification submitted for a product shall be verifiable by the manufacturer. If item(s) bid does not comply with specifications (including brand and/or product number), bidder should state in what respect the item(s) deviate. Failure to note exceptions on the response form will not relieve the successful bidder(s) from supplying the actual products requested.
- 4) Bid Opening: Bidders may attend the bid opening, but no information or opinions concerning the ultimate contract award will be given at the bid opening or during the evaluation process. Bids may be examined 72 hours after request is made. Information pertaining to completed files may be secured by visiting the SLU Purchasing Department during normal working hours. Written bid tabulations will not be furnished.

- CONTINUED

-Rvds. 8/2007

- CONTINUED -

- 5) Louisiana Preference: Preference is hereby given to products produced, manufactured, harvested, grown or assembled in Louisiana which are equal in quality to products produced, manufactured, harvested, grown or assembled outside of Louisiana. The bidder shall state his right to claim the ten percent (10%) preference in his bid response and the bidder should state the respective Louisiana location where each qualifying item is produced, manufactured, harvested, grown or assembled.
- 6) Signature Authority: In accordance with LA Revised Statute 39:1594 (Act 121), the person signing the bid must be: (1) A current corporate officer, partnership member or other individual specifically authorized to submit a bid as reflected in the appropriate records on file with the Secretary of State; or (2) An individual authorized to bind the vendor as reflected by an accompanying corporate resolution or affidavit. By signing the bid, the bidder certifies compliance with the above.

GENERAL CONDITIONS

The SLU Purchasing Department reserves the right to award items separately, grouped or on an all-or-none basis and to reject any or all bids and waive any informalities.

- 1) Prices: Unless otherwise specified in the solicitation, bid prices shall be complete, including transportation and handling prepaid by the bidder to destination - SLU, Hammond, LA. Bids other than FOB destination may be rejected. Bid prices should be quoted in the unit of measure stated. Bid prices shall be firm for a minimum of thirty (30) calendar days, unless otherwise specified by SLU in the solicitation document.
- 2) Payment Terms: Cash discounts for less than 30 days may be offered, but will not be considered in determining awards. Bids containing "payment in advance" or "COD" requirements may be rejected. Payment is to be made within 30 days after receipt of properly executed invoice or delivery, whichever is later.
- 3) Delivery: Bids may be rejected if the delivery time indicated is longer than that specified in the solicitation document.
- 4) Taxes: Bidder is responsible for including all applicable taxes in the bid price. The University is currently exempt from Louisiana State Sales and Use Taxes, and local parish and city taxes. An exemption certificate for state sales and use tax can be provided upon request.
- 5) New Products: Unless specifically called for in the solicitation document, all products for purchase must be new, never previously used, and the current model and/or packaging. No remanufactured, demonstrator, used or irregular product will be considered for purchase unless otherwise specified in the solicitation document. The manufacturer's standard warranty will apply unless otherwise stated in solicitation.
- 6) Default of Contractor: Failure to deliver within the time specified in the solicitation document will constitute a default and may cause cancellation of the contract. Where the University has determined the contractor to be in default, the state reserves the right to purchase any or all products or services covered by the contract on the open market and to charge the contractor with cost in excess of the contract price. Until such assessed charges have been paid, no subsequent bid from the defaulting contractor will be considered.
- 7) Contract Cancellation: The University shall have the right to cancel any contract, in accordance with Purchasing Rules and Regulations, for cause, including but not limited to, the following: (1) failure of the vendor to deliver within the time specified in the contract; (2) failure of the product or service to meet specifications, conform to sample quality, or to be delivered in good condition; (3) misrepresentation by the contractor; (4) fraud, collusion, conspiracy or other unlawful means of obtaining any contract with the state; (5) conflict of contract provisions with constitutional or statutory provisions of state or federal law; (6) any other breach of contract.
- 8) Applicable Law: All contracts shall be construed in accordance with and governed by the laws of the State of Louisiana.
- 9) Equal Opportunity: By submitting and signing this bid, bidder agrees that he will not discriminate in the rendering of services to and/or employment of individuals because of race, color, religion, sex, sexual orientation, age, national origin, handicap, disability, veteran status, or any other non-merit factor.

TITLE: _____ DATE: _____

SOUTHEASTERN LOUISIANA UNIVERSITY

BID RESPONSE FORM CONTINUED

No .	Item	Bid Price Per Unit	Units Needed	Total Bid Price
1.	<p>Provide 205 KW generator w/600 amp ATS, remote annunciator, etc. See attached Specifications.</p> <p>Cummins Power Generation or equal</p> <p>Offering: _____ Make/Model</p> <p>All unit bid prices quoted shall be quoted F.O.B Destination, Freight Prepaid and Allowed.</p>		1 each	

Delivery Time:

Bidder shall indicate maximum anticipated delivery time after receipt of a Purchase Order:
(Check One)

- ☐ 30 days or less after receipt of purchase order
☐ 45 days or less after receipt of purchase order
☐ Other - State _____

Shipping:

All unit bid prices quoted shall be quoted F.O.B Destination, Freight Prepaid and Allowed.
Failure to do so shall cause rejection of the bid without further consideration.

NAME OF BIDDER: _____ BIDDER'S INITIALS _____

Section 1.0: General Requirements**1.0 Scope:**

Provide, and acceptance test a complete and operable Emergency/Standby electric generating system with digital electronic controls, including all devices and equipment specified herein, as shown on the drawings, or required for the service. Equipment shall be new, factory tested, and delivered ready for installation.

1.0.1 Approved Manufacturers: Equipment, documentation, and services described in this specification and shown on the plans are as provided by Cummins Power Generation.

1.0.2 Approval of Substitutes: Proposed substitutions shall include complete submittal data, as specified herein, clearly denoting any and all deviations and/or exceptions to the equipment specified. The complete proposal must be submitted to the engineer for approval/disapproval not less than 14 days prior to the original scheduled bid date. If approved, the Contractor is responsible for the charges of all necessary revisions.

1.1 Submittals:

As a minimum for all equipment specified, 7 each:

- a) Specification and data sheets.
- b) Manufacturer's certification of prototype testing.
- c) Manufacturer's published warranty documents.
- d) Shop drawings showing plan and elevation views with certified overall and interconnection point dimensions.
- e) Interconnection wiring diagrams showing all external connections required; with field wiring terminals marked in a consistent point-to-point manner.

1.2 Warranty: A no deductible warranty shall be provided, **by the manufacturer**, for all products listed in this section. They shall be warranted against defects in materials and workmanship for a period of two years, from the date of initial system start-up.

1.3 Codes and Standards

The generator set and its installation and on-site testing shall conform to the requirements of the following codes and standards:

CSA C22.2, No. 14 – M91 Industrial Control Equipment.

CSA 282, 1989 Emergency Electrical Power Supply for Buildings

EN50082-2, Electromagnetic Compatibility – Generic Immunity Requirements, Part 2: Industrial.

EN55011, Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical Equipment.

FCC Part 15, Subpart B.

IEC8528 part 4. Control Systems for Generator Sets

IEC Std 801.2, 801.3, and 801.5 for susceptibility, conducted, and radiated electromagnetic emissions.

IEEE446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications

SELU

IEEE587 for voltage surge resistance.

Mil Std 461D –1993. Military Standard, Electromagnetic Interference Characteristics.

Mil Std 462D – 1993. Military Standard, Measurement of Electromagnetic Interference Characteristics.

NEMA ICS10-1993 – AC Generator sets.

NFPA70 – National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.

NFPA99 – Essential Electrical Systems for Health Care Facilities

NFPA110 – Emergency and Standby Power Systems. The generator set shall meet all requirements for Level 1 systems. Level 1 prototype tests required by this standard shall have been performed on a complete and functional unit, component level type tests will not substitute for this requirement.

UL508. The entire control system of the generator set shall be UL508 listed and labeled

UL2200. The entire generator package (generator set with enclosure) shall be listed to UL2200 or submit to an independent third party certification process to verify compliance as installed.

The generator set manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

- 1.4 Manufacturers' Requirements:** Single manufacturer responsibility is mandatory for complete engine-generator sets, and automatic transfer switches, including manufacturing of engine and/or the alternator, building of set, factory test, factory warranty, & shipping. To be classified as a manufacturer, the builder of the generating set must manufacture the engine or the alternator (generator), and it must be built at the Manufacturing Plant. Coordination between manufacturer, service firm, & installer is mandatory.

The manufacturer shall have printed literature & brochures describing the standard series offered (not a one of a kind fabrication). The manufacturer shall furnish schematic & wiring diagrams for the engine/alternator sets, and transfer switches. Sets not factory assembled as a standard model with all controls, alternator, & engine, and tested together, as a system, with the paralleling equipment will not be acceptable.

- 1.5 Single Supplier:**

The supplier shall be the manufacturer's authorized distributor, who has served in this capacity for the last ten (10) years, and is located no more than 100 miles from the jobsite. The supplier shall provide initial start-up services, conduct field acceptance testing, and warranty service on all of the equipment specified herein. The supplier shall have 24-hour service availability and factory-trained service technicians authorized to do warranty service on all warrantable products, and maintain stock of standard spare parts. Facilities open for inspection of the Engineer.

Section 2.0: Gaseous Fueled - Engine-Generator Sets

- 2.1 Gaseous Fueled Engine-Generator Set:** Engine-generator set rated to supply at least 205 KW on natural gas without deration, at a continuous standby rating, based upon an altitude of 3000 feet, and ambient temperatures up to 104 degrees F., 120/208 volt, three phase, 60 hertz, 1800 rpm,

The generator set shall include inherent overcurrent, short circuit and overload protection, digital and analog AC metering equipment, sensor failure detection, and remote monitoring and control capability. No exceptions or deviations to these requirements will be permitted.

- 2.1.1 Prototype Tests and Evaluation:**

SELU

Prototype tests shall have been performed on a complete and functional unit, component level type tests will not substitute for this requirement. The performance test of the generating set series shall be in accordance with procedures certified by an independent testing laboratory. Prototype testing shall comply with the requirements of NFPA 110 for level 1 systems, which will include:

Maximum power level, maximum motor starting capacity, structural soundness torsigraph analysis per MIL-STD-705B, Method 504.2 fuel consumption, engine alternator temperature rise per NEMA MG1-22.40 single step load pick up, harmonic analysis & voltage wave for deviation per MIL-STD-705B, Method 601.4, 3 phase, short circuit test for mechanical & electrical strength.

2.1.2 Performance:

Voltage regulation shall be ± 1.0 percent for any constant load between no load and rated load.

Frequency regulation shall be isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed plus or minus 0.5%.

The engine-generator set shall be capable of single step load pick up of 100% nameplate kW and power factor, less applicable de-rating factors, with the engine-generator set at operating temperature.

The motor starting capability, of the generator set, shall be a minimum of 640 kVA @ 35% voltage dip, and 110 kW maximum surge power. The generator set shall be capable of sustaining a minimum of 90% of rated no load voltage with the specified kVA load at near zero power factor applied to the generator set. The alternator is oversized due to motor starting requirements on site.

2.1.3 Engine: The engine shall be spark ignited, gaseous fueled, 4 cycle, with 6 cylinders, and be certified to U.S. EPA SI Stationary Emission Standard 40 CFR, Part 60. The engine shall have a minimum displacement of 855 cubic inches and minimum brake horsepower of 319. Engine accessories and features shall include:

Engine fuel system: The engine shall run off of natural gas as it's primary fuel source. The fuel system shall include a secondary regulator, fuel strainer, solenoid valve, and section of U.L. listed flexible fuel line with all necessary fuel piping and accessories, installed by a licensed mechanical contractor, and as required for the installation.

An electronic governor system shall provide automatic isochronous frequency regulation. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions. The control system shall actively control the fuel rate and excitation as appropriate to the state of the generator set. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, accelerating to rated speed, and operating in various isochronous states. The engine governing system shall not utilize any exposed operating linkage.

The engine shall be cooled by a high ambient, 122 deg. F., (50 deg. C.) unit-mounted closed loop radiator system rated for full rated load operation. Radiators shall be provided with a duct adapter flange. The cooling system shall be filled with 50/50 ethylene glycol/water mixture by the equipment supplier. Rotating parts shall be guarded against accidental contact.

SELU

An electric starter(s) capable of three complete cranking cycles without overheating. Positive displacement, mechanical, full pressure, lubrication oil pump. Full flow lubrication oil filters with replaceable spin-on canister elements and dipstick oil level indicator.

Replaceable dry element air cleaner with restriction indicator.

Engine mounted battery charging alternator, 37 ampere minimum, and solid-state voltage regulator.

- 2.1.4 AC Generator: The AC generator shall be; synchronous, four pole, 2/3 pitch, revolving field, drip-proof construction, single pre-lubricated sealed bearing, air cooled by a direct drive centrifugal blower fan, and directly connected to the engine with flexible drive disc.

The generator shall be capable of a minimum of 112 Kw at a 105 degree C. rise rating. Job site requirements require the alternator to be oversized for motor starting.

All insulation system components shall meet NEMA MG1 temperature limits for Class H insulation system. Actual temperature rise measured by resistance method at full load shall not exceed 105 degrees centigrade.

The generator shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage not more than 5 percent above or below rated voltage.

- 2.1.5 Engine-Generator Set Control:

The generator set shall be provided with a microprocessor-based control system which is designed to provide automatic starting, monitoring, and control functions for the generator set. The control system shall also be designed to allow local monitoring and control of the generator set, and remote monitoring and control as described in this specification. The control shall be mounted at the location shown on the project drawings for medium voltage applications, and on the generator set for 600 volt and lower applications. When mounted on the generator set the control shall be vibration isolated and prototype tested to verify the durability of all components in the system under the vibration conditions encountered. The control shall be UL508 labeled, CSA282-M1989 certified, and meet IEC8528 part 4. All switches, lamps and meters shall be oil-tight and dust-tight, and the enclosure door shall be gasketed. There shall be no exposed points in the control (with the door open) that operate in excess of 50 volts. The controls shall meet or exceed the requirements of Mil-Std 461C part 9, and IEC Std 801.2, 801.3., and 801.5 for susceptibility, conducted, and radiated electromagnetic emissions. The entire control shall be tested and meet the requirements of IEEE587 for voltage surge resistance.

The generator set mounted control shall include the following features and functions:

Three position control switch labeled RUN/OFF/AUTO. In the RUN position the generator set shall automatically start, and accelerate to rated speed and voltage. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position the generator

set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage.

Red "mushroom-head" push-button EMERGENCY STOP switch shall cause the generator set

SELU

to immediately shut down, and be locked out from automatic restarting.

Push-button RESET switch. The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.

Push-button PANEL LAMP switch. Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off 10 minutes after the switch is depressed, or after the switch is depressed a second time.

Generator Set AC Output Metering: The generator set shall be provided with both an analog and digital metering set with the following features and functions:

Color coded analog bargraph metering shall be provided to include voltmeter, ammeter, frequency

meter, and kilowatt (KW) meter. These meters shall be color coded in the following fashion: readings from 0-90% of generator set standby rating: green; readings from 90-100% of standby rating: amber; readings in excess of 100%: red.

A digital metering set shall also be provided, 0.5% accuracy, to indicate generator RMS voltage and current, frequency, output current, output KW, KW-hours, and power factor. Generator output

voltage shall be available in line-to-line and line-to-neutral voltages, and shall display all three phase voltages (line to neutral or line to line) simultaneously.

Generator Set Alarm and Status Message Display: The generator set shall be provided with alarm and status indicating lamps to indicate non-automatic generator status, and existing alarm and shutdown conditions. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright room lighting conditions. The generator set control shall indicate the existence of the following alarm and shutdown conditions on a digital display panel:

- low oil pressure (alarm)
- low oil pressure (shutdown)
- oil pressure sender failure (alarm)
- low coolant temperature (alarm)
- high coolant temperature (alarm)
- high coolant temperature (shutdown)
- engine temperature sender failure (alarm)
- low coolant level (alarm or shutdown--selectable)
- fail to crank (shutdown)
- overcrank (shutdown)
- overspeed (shutdown)
- low DC voltage (alarm)
- high DC voltage (alarm)
- weak battery (alarm)
- low fuel-daytank (alarm)
- high AC voltage (shutdown)
- low AC voltage (shutdown)
- under frequency (shutdown)
- over current (warning)
- over current (shutdown)
- short circuit (shutdown)
- over load (alarm)
- emergency stop (shutdown)

In addition, provisions shall be made for indication of two customer-specified alarm or shutdown conditions. Labeling of the customer-specified alarm or shutdown conditions

SELU

shall be of the same type and quality as the above specified conditions. The non-automatic indicating lamp shall be red, and shall flash to indicate that the generator set is not able to automatically respond to a command to start from a remote location.

Engine Status Monitoring:

The following information shall be available from a digital status panel on the generator set control :

engine oil pressure (psi or kPA)

engine coolant temperature (degrees F or C; Both left and right bank temperature shall be indicated on V-block engines.)

engine speed (rpm)

number of hours of operation (hours)

number of start attempts

battery voltage (DC volts)

Control Functions:

The control system provided shall include a cycle cranking system, which allows for user selected crank time, rest time, and # of cycles. Initial settings shall be for 3 cranking periods of 15 seconds each, with 15 second rest period between cranking periods.

The control system shall include an engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while the unit is starting. The governor control shall be suitable for use in paralleling applications without component changes.

The control system shall include time delay start (adjustable 0-300 seconds) and time delay stop (adjustable 0-600 seconds) functions.

The control system shall include sender failure monitoring logic for speed sensing, oil pressure, and engine temperature which is capable of discriminating between failed sender or wiring components, and an actual failure conditions.

Alternator Control Functions:

The generator set shall include an automatic voltage regulation system which is matched and prototype tested with the governing system provided. It shall be immune from misoperation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase RMS sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic, which shall reduce output voltage in proportion to frequency below a threshold of [58-59] HZ. The voltage regulator shall include adjustments for gain, damping, and frequency roll-off. The voltage regulation system shall include provisions for reactive load sharing and electronic voltage matching for paralleling applications. Motorized voltage adjust pot is not acceptable for voltage matching.

Controls shall be provided to monitor the output current of the generator set and initiate an alarm when load current exceeds 110% of the rated current of the generator set on any phase for more than 60 seconds. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator.

Controls shall be provided to monitor the KW load on the generator set, and initiate an alarm condition when total load on the generator set exceeds the generator set rating for in excess of 5 seconds.

SELU

Controls shall include a load shed control, to operate a set of dry contacts (for use in shedding customer load devices) when the generator set is overloaded. An AC over/under voltage monitoring system which responds only to true RMS voltage conditions shall be provided. The system shall initiate shutdown of the generator set when alternator output voltage exceeds 110% of the operator-set voltage level for more than 10 seconds, or with no intentional delay when voltage exceeds 130%. Under voltage shutdown shall occur when the output voltage of the alternator is less than 85% for more than 10 seconds.

Control Interfaces for Remote Monitoring: All control and interconnection points from the generator set to remote components shall be brought to a separate connection box. No field connections shall be made in the control enclosure or in the AC power output enclosure. Provide the following features in the control system:

Form "C" dry common alarm contact set rated 2A @ 30VDC to indicate existence of any alarm or shutdown condition on the generator set.

One set of contacts rated 2A @ 30VDC to indicate generator set is ready to load. The contacts shall operate when voltage and frequency are greater than 90% of rated condition.

A fused 10 amp switched 24VDC power supply circuit shall be provided for customer use. DC power shall be available from this circuit whenever the generator set is running.

A fused 20 amp 24VDC power supply circuit shall be provided for customer use. DC power shall be available from this circuit at all times from the engine starting/control batteries.

The control shall be provided with provisions for connection of remote monitoring equipment as described herein or shown on the drawings.

- 2.1.6** A battery monitoring system shall be provided to load test the battery bank each time the engine starts and a "weak battery" alarm shall be initiated, when the starting voltage drop is outside of normal limits.

- 2.1.7** **Base:** The engine-generator set shall be mounted on a heavy duty steel base to maintain alignment between components. The base shall incorporate a battery tray with hold-down clamps within the rails.

- 2.1.8** **Generator Set Auxiliary Equipment and Accessories:**

Coolant heater: Engine mounted, thermostatically controlled, coolant heater(s) for each engine. Heater voltage shall be as shown on the project drawings. The coolant heater shall be UL499 listed and labeled.

Starting and Control Batteries: Starting battery bank shall be calcium/lead antimony type, 12 volt DC, sized as recommended by the engine manufacturer, complete with battery cables and connectors.

Battery Charger: A UL listed/CSA certified 15 amp voltage regulated battery charger shall be provided for the engine-generator set. The charger may be located in an automatic transfer switch, or may be wall mounted if the generator is located indoors. Input AC voltage and DC output voltage shall be as required.

Remote Annunciator: Provide and install a 20-light LED remote alarm annunciator, located as shown on the drawings or in a location which can be conveniently monitored by facility personnel. The remote annunciator shall provide all the audible and visual alarms called for by NFPA Standard 110 for level 1 systems; and in addition shall provide indications for high battery voltage, low battery voltage, loss of normal power to the charger. Spare lamps shall be

SELU

provided to allow future addition of other alarm and status functions to the annunciator. Provisions for labeling of the annunciator in a fashion consistent with the specified functions shall be provided. Alarm silence and lamp test switch(es) shall be provided. LED lamps shall be replaceable, and indicating lamp color shall be capable of changes needed for specific application requirements. Alarm horn shall be switchable for all annunciation points. Alarm horn (when switched on) shall sound for first fault, and all subsequent faults, regardless of whether first fault has been cleared, in compliance with NFPA110 3-5.6.2.

The generator set shall be both inherently self-protecting, and provided with a mounted main line circuit breaker, sized to carry the rated output current of the generator set on a continuous basis. The inherent protection device, and the line circuit breaker shall both be U.L. listed as overcurrent protection. The circuit breaker shall incorporate an electronic trip unit that operates to protect the alternator under all overcurrent conditions, or a thermal-magnetic trip with other overcurrent protection devices that positively protect the alternator under overcurrent conditions. The supplier shall submit time overcurrent characteristic curves and thermal damage curve for the alternator, demonstrating the effectiveness of the protection provided.

Outdoor Weather-protective Housing: factory-assembled to generator set base and radiator cowling. Housing shall provide ample airflow for generator set operation. The housing shall have hinged side-access doors and rear control door. All doors shall be lockable. All sheet metal shall be primed for corrosion protection and finish painted with the manufacturers standard color. The housed generator shall be U.L. 2200 listed as a package.

Exhaust muffler(s) shall be provided, size and type as recommended by the generator set manufacturer. The muffler shall be critical grade. Exhaust system shall be factory installed inside of the generator enclosure.

- 2.1.4 **Automatic Transfer Switch:** Provide complete factory assembled power transfer equipment with field programmable digital electronic controls designed for fully automatic operation and including: surge voltage isolation, voltage sensors on all phases of both sources, linear operator, permanently attached manual handles, positive mechanical and electrical interlocking, and mechanically held contacts for both sources. Equipment rated 1000 amps and less shall include quick-make, quick-break contact mechanisms for manual transfer under load.

The generator set manufacturer shall warrant transfer switches to provide a single source of responsibility for all the products provided, and it shall have the same warranty coverage as the generator set. Technicians specifically trained to support the product and employed by the generator set supplier shall service the transfer switches.

The transfer switch and accessories shall be UL listed and labeled, tested per UL Standard 1008, and CSA Approved.

- 2.2.1 **Ratings:** Provide a 600 amp automatic transfer switch, 3 phase, 3 pole. Main contacts shall be rated for 600 Volts AC minimum.

Transfer switches shall be rated to carry 100 percent of rated current continuously in the NEMA 3R enclosure. Circuit breaker type transfer switches do not meet this specification.

Transfer switches shall be continuously rated in ambient temperatures of -40 to +50 degrees C, relative humidity up to 95% (non-condensing), and altitudes up to 10,000 feet.

Transfer switch equipment shall have a withstand and closing rating (WCR) of 65 kA in RMS symmetrical amperes when protected by a MCCB.

SELU

2.2.2

Construction:

Operator Panel. Each transfer switch shall be provided with a control panel to allow the operator to view the status and control operation of the transfer switch. The operator panel shall be a sealed membrane panel rated NEMA 3R/IP53 or better (regardless of enclosure rating) that is permanently labeled for switch and control functions. The operator panel shall be provided with the following features and capabilities.

High intensity LED lamps to indicate the source that the load is connected to (source 1 or source 2); and which source(s) are available. Source available LED indicators shall operate from the control microprocessor to indicate the true condition of the sources as sensed by the control.

High intensity LED lamps to indicate that the transfer switch is "not in auto" (due to control being disabled or due to bypass switch (when used) enabled or in operation) and "Test/Exercise Active" to indicate that the control system is testing or exercising the generator set.

"OVERRIDE" pushbutton to cause the transfer switch to bypass any active time delays for start, transfer, and retransfer and immediately proceed with its next logical operation.

"TEST" pushbutton to initiate a preprogrammed test sequence for the generator set and transfer switch. The transfer switch shall be programmable for test with load or test without load.

"RESET/LAMP TEST" pushbutton that will clear any faults present in the control, or simultaneously test all lamps on the panel by lighting them.

The control system shall continuously log information on the number of hours each source has been connected to the load, the number of times transferred, and the total number of times each source has failed. This information shall be available via an operator display panel.

Security Key Switch to allow the user to inhibit adjustments, manual operation or testing of the transfer switch unless key is in place and operated.

Vacuum fluorescent alphanumeric display panel shall be provided with push-button navigation switches. The display shall be clearly visible in both bright (sunlight) and no light conditions. It shall be visible over an angle of at least 120 degrees. The Alphanumeric display panel shall be capable of providing the following functions and capabilities:

Display source condition information, including AC voltage for each phase of normal and emergency source, frequency of each source. Voltage for all three phases shall be displayed on a single screen for easy viewing of voltage balance.

Display source status, to indicate source is connected or not connected.

Display load data, including 3-phase AC voltage, 3-phase AC current, frequency, KW, KVA, and power factor. Voltage and current data for all phases shall be displayed on a single screen.

The display panel shall allow the operator to view and make the following adjustments in the control system, after entering an access code:

Set nominal voltage and frequency for the transfer switch.

Adjust voltage and frequency sensor operation set points.

Set up time clock functions.

Enable or disable control functions in the transfer switch, including program transition.

Set up exercise and load test operation conditions, as well as normal system time delays for transfer time, time delay start, stop, transfer, and retransfer.

Control shall be designed for a high level of immunity to power line surges and transients, demonstrated by test to IEEE Standard 587-1980. The control shall have optically isolated logic inputs, high isolation transformers for AC inputs, and relays on all outputs.

Undervoltage sensors shall simultaneously monitor all phases of both sources.

Pick-up and drop-out settings shall be adjustable. Voltage sensors shall allow for adjustment

SELU

to sense partial loss of voltage on any phase. Voltage sensors shall have field calibration of actual supply voltage to nominal system voltage.

Automatic controls shall signal the engine-generator set to start upon signal from normal source sensors. Solid-state time delay start, adjustable from 0 to 5 seconds (factory set at 2 seconds) shall avoid nuisance start-ups. Battery voltage starting contacts shall be gold, dry type contacts factory wired to a field wiring terminal block.

The switch shall transfer when the emergency source reaches the set point voltage and frequency. Provide a time delay on transfer, adjustable from 0 to 120 seconds.

The switch shall retransfer the load to the normal source after a time delay retransfer, adjustable from 0 to 30 minutes. Retransfer time delay shall be immediately bypassed if the emergency power source fails.

Controls shall signal the engine-generator set to stop after a time delay, adjustable from 0 to 10 minutes, beginning on return to the normal source.

Power for transfer operation shall be from the source to which the load is being transferred.

Transfer switches shall be equipped with a field adjustable time delay neutral, during which time the load is isolated from both power sources, to allow load residual voltage to decay before closure to the opposite source. This delay feature shall have an adjustable range of 0 to 60 seconds. Phase angle monitors are not acceptable.

Transfer switch shall be provided with a solid state exerciser clock to set the day, time, and duration of generator set exercise/test period. Provide a with/without load selector switch for the exercise period.

OTHER REQUIREMENTS

Factory Testing. The transfer switch supplier shall perform a complete operational test on the transfer switch prior to shipping from the factory. A certified test report shall be available on request. Test process shall include calibration of voltage sensors.

Service and support

The manufacturer of the transfer switch shall maintain service parts inventory at a central location which is accessible to the service location 24 hours per day, 365 days per year.

The transfer switch shall be serviced by a local service organization that is trained and factory certified in both generator set and transfer switch service. The supplier shall maintain an inventory of critical replacement parts at the local service organization, and in service vehicles. The service organization shall be on call 24 hours per day, 365 days per year.

The manufacturer shall maintain model and serial number records of each transfer switch provided for at least 20 years.

Section 3.0: Execution

3.1 Factory Tests:

Generator set factory tests on the equipment to be shipped, shall be performed at rated load and .8 PF. Generator sets that have not been factory tested at rated PF will not be acceptable. Tests shall include: run at full load, maximum power, voltage regulation, transient and steady-state governing, single step load pickup, and safety shutdowns.

SELU

Transfer equipment factory tests: Each transfer switch supplied shall be factory tested before shipment. Factory tests shall include a complete functional test of the transfer switch controls, including calibration of the voltage sensors.

3.2 On-Site Acceptance Test:

The complete installation shall be tested for compliance with the specification following completion of all site work. Testing shall be conducted by representatives of the manufacturer, with required fuel supplied by Contractor. The Engineer shall be notified in advance and shall have the option to witness the tests. Installation acceptance tests to be conducted on-site shall include testing the local and remote panels, simulate engine shutdowns, conduct a "cold start" test, a two hour full load test using a resistive load bank, and a one step rated load pickup test in accordance with NFPA 110. Demonstrate that the batteries and starting motor are capable of 3 starting attempts of 15 second cranking at 15 second intervals. If during the load test a shutdown should occur, the cause of the shutdown will be corrected and the 2 hour test restarted.

During the load test, record at 30 minute intervals:

- Time of day
- KW
- Voltage and amperes on each phase
- Engine RPM
- Frequency
- Engine coolant temperature
- Oil pressure
- Ambient temperature

At completion of the testing, instruct the owner's personnel in the proper operation and maintenance of the system, and leave the site with the system in a fully operational condition.